



Relational Artifacts/Children/Elders: The Complexities of CyberCompanions

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Abstract

This is a report that reflects work from several studies in which commercially available robotic creatures, Furbies, My Real Babies and AIBOs, were introduced into two nursing home settings in Massachusetts as well as into the lives of children, both in school settings and in their homes. The purpose of integrating case studies from these disparate studies is to open up a conversation about the range of issues that are raised by even very simple relational artifacts as a matrix for building relationships. These issues are important for two main reasons. First, ethnographic work with even simple robots illustrates how cybercompanions are evocative objects for reflection on such issues as what is essential about aliveness, about being a person and about the roles of thought and feeling, affect and cognition in defining human uniqueness. Second, this paper reports on individual differences among the users of robotic technology, differences that have to do with personality and cognitive style. As robots move into the therapeutic domain, such individual differences will become increasingly relevant to the field of "clinical robotics."

Relational Artifacts

Here I report on studies in which I used Tiger Electronics' Furby, Sony's AIBO, and Hasbro's My Real Baby to study the reaction of senior citizens and children to simple robotic creatures. My working hypothesis: even the simplest encounters with an object that simulates social interaction provides a window onto the psychology of the encounters between people and relational artifacts, here defined as artifacts that have inner "states of mind" and where encounters with the artifacts are enriched through understanding these inner states. In the literature, such creatures are otherwise discussed, sometimes, for example as "sociable robots" (Breazeal, 2000, 2002, Breazeal and Scasselatti, 1999, 2000). I prefer to talk of them as relational artifacts because of the connection of this way of speaking to the psychoanalytic/psychodynamic tradition (Turkle, 2004a, 2004b).

Case Studies of Seniors

Interacting with computational objects has an effect on how we think about ourselves. For example, people tend to define what is special about being human by comparing themselves to their "nearest neighbors," so when our nearest neighbors were pets, people declared themselves special because of their intellects (Turkle, 1984, Turkle, 1995). When computers were primitive machines and began to be analogized to people, people were superior because of their

superior intellects as well. As the computers became smarter, people's emphasis shifted to the soul and the spirit in the human machine in order to maintain a sense of difference. In case studies of seniors, they too, searched for what set them apart from machines, and reached, first of all, for emotion. But even the fairly primitive My Real Baby posed some challenges to this strategy because it seemed to have emotions. Seniors then turned to biological criteria, a response exemplified in the case of Jonathan. In the presence of relational artifacts, what makes people special is the fact that we are biological beings rather than mechanical ones. People's "feelings" are not devalued, but they no longer seem equal to the task of putting enough distance between ourselves and the robots we have created in our image. Our bodies, our sexuality, and our spirituality simply do a better job.

Beyond the evocation of philosophical reflection, interacting with relational artifacts seemed to put some seniors in touch with significant life relationships. (See Drexler, 1999; Hirsch, et al, 2000) For example, it was not unusual over time for seniors to re-enact scenes from their children's youth or important moments in their relationships with spouses.

Although many of the seniors I interviewed had non-robotic dolls or stuffed animals in their possession, the staff of one of the nursing homes felt the seniors' relationships with the robots were different enough to justify buying robotic dolls with her own funds to supplement the dolls provided through our project. Seniors were more comfortable playing out family scenes with the robot dolls than with traditional dolls. Possible explanations include the robot doll's interactivity and responsiveness and the social "permission" that being with a robot provided since the robots are presented as being a "grownup" activity. It is significant that the nursing staff supported the purchase of additional dolls, among other things because it gave the elders something to talk about. This use of the robots to build "community" was something I did not anticipate when I began the project. I found it quite promising.

Different seniors had different styles of relating to relational artifacts. Here I characterize two approaches through illustrative case studies: scientific/exploratory illustrated by Jonathan and relational-animistic highlighted by Andy.

It is important that robotics research appreciate these individual differences in style, both cognitive and affective. If the field wishes to move into serious therapeutic work, these individual differences will have significant clinical importance.

Jonathan/ Scientific-Exploratory Approach

Jonathan, 74, approaches relational artifacts in a detached manner, with a desire to analyze them engineer-style. At the time of our study, Jonathan had been in the nursing home for two years. He is well-spoken, curious, and intelligent. He is not social, but tends to be reclusive, even sullen, with slow and precise movements. He has been diagnosed as having obsessive-compulsive tendencies and has lived a very solitary life, with few friends. He has never married and has no children. He was an accountant for most of his life, but was most happy when he worked on a computer software assembly line. Jonathan tells us that throughout his life he has been regularly ridiculed for his obsessive ways.

From his first interaction with the My Real Baby doll at a group activity to his last interview after having kept the doll for four months in his room, Jonathan remained fascinated with how the doll functioned. His handling of the doll is methodological and exploratory. He handles the doll with emotional detachment, and relates to it as a technological novelty.

When Jonathan first takes the doll, which is cooing and giggling, he bounces it up and down, looks it over carefully, pokes and squeezes it in different places, and moves its limbs. He focuses on the doll's reactions. He tries hard to understand what the doll says and where the sound comes from. He discovers that its voice comes from its stomach and puts it up to his ear. When asked about his first impression of My Real Baby, Jonathan says:

I think that this doll is a very remarkable toy. I have never seen anything like this before. But I'd like to know, how in the entire universe is it possible to construct a doll that talks like this?

Jonathan talks to the researchers about the doll but does not speak to the doll itself. Although Jonathan sometimes refers to the doll as "she," he relates to it as an object, rather than as a sentient being.

When we ask Jonathan what he plans to do with the doll when we will leave it with him for several months during our study, he answers "I suppose [I will] touch it in various places and listen to what she says." His interactions with the doll are a series of experiments. Most notably, he slaps the doll to test how it reacts, as he says "to see if the doll will start crying." This is a way for Jonathan to test how life-like the doll is, and to continue to compare the doll's behavior to that of a real baby. His exploration also involves opening the back of the doll with a screwdriver and taking out and

replacing the batteries. He follows the instruction manual to the letter. Although Jonathan relates to the doll as an object, he says that looking inside the doll could help him establish an emotional bond with it.

Jonathan: I think an emotional contact [with the doll] does mean something to me. Yes, I think I would enjoy having an emotional contact with it.

Researcher: Do you think you could have an emotional contact with it?

Jonathan: I believe I could.

Researcher: What could make that happen?

Jonathan: Well, if I would have had the Philips screwdriver and I had been able to try and follow everything in the instruction manual that would have happened. In fact that might happen now as I'm going through the instruction manual.

Researcher: Does it feel like you are getting to know her?

Jonathan: Yes!

Nevertheless, Jonathan, who was very close to the cats he had before moving to the home and describes them as his ideal companions, cannot imagine developing a similar relationship with robotic creatures or pets. Despite his statement that he believes he could have an emotional contact with My Real Baby, he distinguishes what he imagines that relationship could be from one with the affections and satisfactions offered by a live animal.

Researcher: Do you think you could develop the same kind of relationship with a robot animal as with the cat you used to have?

Jonathan: No. Because some of the things I used to enjoy with the cat are things that I could never have with a robot animal. Like the cat showing affection, jumping up on my lap, letting me pet her and listening to her purr, a robot animal couldn't do that and I enjoyed it very much.

Researcher: What if the robot cat could do that? What if you couldn't tell from the behavior that they were robots?

Jonathan: Yes, but what I liked was how the cat showed me that she really liked me. How can these robot animals show affection? I just think that a robot animal couldn't give me as much satisfaction as a real animal could... I don't see how a robot animal could possibly show me that it really likes me. I don't see how it could really show me any affection.

For Jonathan there is an important difference between something alive and an object that acts as though it is alive.

Likewise, Jonathan feels that it would be embarrassing for an adult woman to interact with a robot baby, even if you could not tell that it was not a live baby. He believes that the robot doll can bring comfort to adults and seniors but that interacting with one should be done in private.

Although Jonathan does not think the doll is “smart” enough to bond with, he describes that he would feel more comfortable speaking to a computer rather than with a person about his most intimate matters:

For things about my life that are very private, I would enjoy talking more to a computer... but things that aren't strictly private I would enjoy more talking to a person... Because if the thing is very highly private and very personal it might be embarrassing to talk about it to another person, and I might be afraid of being ridiculed for it... And it wouldn't criticize me... Or let's say that I wanted to blow off steam, it would be better to do it to a computer than to do it to a living person who has nothing to do with the thing that's bothering me. [I could] express with the computer emotions that I feel I could not express with another person, to a person.

Jonathan's ascetic and solitary lifestyle, his history of being marginalized by peers, and lack of family are the context an attraction to computers as potentially better and more trustworthy friends than people.

Andy/Relational-Animistic Approach

Andy's “relational-animistic” approach involves treating robotic dolls and pets as sentient; he is very emotionally invested in his interactions with them.

Andy, 76, is recovering from a serious depression. At the end of each of our visits to the nursing home, Andy makes us promise to come back to see him as soon as we can. Andy feels abandoned by family and friends. He wishes there were more people with whom he could talk about his life and problems. He participates in a day-program outside the home, but still often feels bored and lonely. Andy does not have any children of his own, or any close family. He is in touch with his step-children, but the person he misses most is his ex-wife Rose. He reads to us some of the songs he has written for her and some of the letters she has sent him. He loves animals and has decorated his room with tens of cat pictures; he tells us that some of his happiest moments are being outside in the nursing home's garden speaking to birds, squirrels, and neighborhood cats. He believes they communicate with him and considers them his friends.

Andy's relational-animistic approach is manifested as soon as we hand him the My Real Baby doll. He takes the doll in his arms and holds the doll with the gentleness that one

would show an infant. When he responds to questions, Andy speaks about the doll, but at most other times, he speaks directly to the doll, as to a little girl. He talks to the doll as if it were alive:

[Doll is babbling] Oh yeah? You sound so good. You are so pretty too. You are so nice. Your name's Marie. Right? You like Marie? You are so pretty. You have such pretty eyes. Oh yeah? You are telling me a good story! You are going to be a pretty girl when you get big. [The doll cries] Don't cry. You want to be a big girl, don't you? It reminds me of a real baby.

During each of our visits, Andy holds the doll close to his chest, rubs the doll's back in a circular motion, and lovingly says to the doll, “I love you. Do you love me?” As Andy gets more emotionally attached to My Real Baby and to AIBO and Furby, he increasingly tries to nurture them. In the case of My Real Baby, he gives the doll its bottle when it is “hungry.” In the case of his play with AIBO and Furby, he tries to determine the robots' “needs,” doing his best to make them happy. Furthermore, Andy wants to protect the robots. Once when he saw that Jonathan was spanking My Real Baby, he tried to enlist the the Furby to “make Jonathan stop hurting the baby.”

Andy interacts with My Real Baby as a live toddler. He makes funny faces at the doll, as if to prevent her from falling asleep or just to amuse her. When the doll laughs with perfect timing as if responding to his grimaces, Andy laughs back, joining her; he thinks they are bonding. Andy seems genuinely happy and involved in such interactions. At the same time, this kind of play with the doll does not necessarily mean that Andy is not aware that he is playing with a doll. Andy emphasizes that he knows the doll is a toy and not “really” alive. He is able to relate to the doll as a sentient other but also recognize it as an object.

Andy continues to display great affection and a strong emotional attachment to My Real Baby throughout the three months that he keeps the doll. He relates to it not as an object but in a spirit of reciprocity, validating its emotional state. A passage from an interview with Andy further illustrates this point:

I made her talk and I made her say Mama and other things, and everything else. I enjoyed it greatly. It was something to do, when I had nothing to do...when I wasn't at the day program, I'd play with her, I mean we'd talk and everything, and it was so nice. I am so glad you brought it.

The seniors who highly anthropomorphize relational artifacts generally use these robotic creatures as evocative objects that remind them of various people in their lives and

allow them to work on certain unresolved issues. In the case of Andy, this psychological work was facilitated by the doll's coming to represent his ex-wife:

Researcher: What are some things that you talked to the doll about?

Andy: Everything. If somebody heard me they would probably think that I'm crazy

Researcher: Did you give the doll a name?

Andy: Rose, that was my ex-wife's name

Researcher: Did you pretend that it was Rose when you talked to her?

Andy: Yeah. I didn't say anything bad to her, but some things that I would want to say to her, it helped me to think about her and the time that I didn't have my wife, how we broke up, think about that, how I miss seeing her... the doll, there's something about her, I can't really say what it is, but looking at her reminds me of a human being. She looks just like her, Rose, my ex-wife, and her daughter.

Researcher: Is it something in the face?

Andy: Yeah, you know, how my wife looks, just like that, it reminds me sometimes by looking at her when I see her, something in her face is the same, looking at her makes me feel more calm, I can just think about her and everything else in my life.

Andy speaks at length about his difficulty getting over his divorce, his feelings of guilt for his relationship with Rose not working out, and his hope that his ex-wife and he might someday be together again. Andy explains how having the doll enabled him to try out different scenarios that might reconcile him with Rose. The doll's presence enabled him to vent his feelings of regret, frustration, and attachment. Andy explains that although he had stuffed animals and even one plain doll in his late adult life, that none of these ever reminded him of his ex-wife because they did not move like this doll and did not seem as "real."

Researcher: How does it make you feel to talk to the doll?

Andy: Good. It lets me take everything inside me out, you know, that's how I feel talking to her, getting it all out of me and feel not depressed . . . when I wake up in the morning I see her over there, it makes me feel so nice, like somebody is watching over you.

Andy: It will really help me [to keep the doll] because I am all alone, there's no one around, so I

can play with her, we can talk. It will help me get ready to be on my own.

Researcher: How?

Andy: By talking to her, saying some of the things that I might say when I did go out, because right now, you know I don't talk to anybody right now, and I can talk much more right now with her than, I don't talk to anybody right now.

In contrast with Jonathan who kept the doll in a bag in a closet, Andy put his favorite baseball hat on the doll and displayed it proudly on his windowsill—it is the first thing people saw when they walked into his room. He enjoyed showing the doll to visitors and introduced the doll almost as if he was presenting a friend or family member.

Children and Relational Artifacts

We observed children in groups, usually in school settings and also gave children AIBOs and Furbies to take home to "adopt" for weeklong periods. In this second case, children and their parents recorded their experience with the artifacts in a daily journal. I conducted initial and final interviews with the children and sometimes with their parents and siblings.

We found that children describe robotic pets and dolls as "sort of alive" because of the quality of their emotional attachments to the relational artifacts and because of their fantasies about the idea that the relational artifacts might be emotionally attached to them. The key element seems to be the children's fantasies about the objects needing them for nurturance.

With children, differences in approach to the artifacts had less to do with age and gender than with individual personalities and life experiences. Three case studies further illustrate a range of approaches, including detached-biological, imaginative-maternal, and life-situating.

Orelia/Detached-Biological Approach

A detached-biological approach attributes no sentience or legitimate emotionality to relational artifacts because they are not living and breathing organisms. Children who hold this view, generally do not find relational artifacts worth bonding with, or if they do so, profess that this kind relationship can never approximate the kind of bond they can have with a person or animal.

We first met Orelia, 10, during one of our relational artifacts group activities at a private Boston-area middle school. Orelia is bright and articulate and tells us that her favorite hobby is reading. She is rather small and wears large round glasses. She is comfortable around adults and eager to impress. Orelia attends one of the interviews with her younger brother Jake, 9, who in contrast seems very young for his age. Orelia's mother very glamorous, very "made-

up.” She is very distant from Orelia, something that may be relevant to Orelia’s reactions to relational artifacts.

When she first meets AIBO and My Real Baby, Orelia quickly declares that that they are “programmed” and “artificial.” She sees them as machines without memories or a brain, and says she has little desire to nurture either. She argues that these objects are unsatisfactory substitutes for the “real” thing, a baby or a puppy. Orelia comments that AIBO is not alive like a real pet because it is not biologically alive, it does not breathe. Given the choice, Orelia says that would always choose a real dog over an AIBO.

Orelia says that the capacity for memory is associated with the capacity for love and attachment. When we ask if she thinks that AIBO can love, Orelia answers “Well, it’s programmed to do it. If they love, then it’s artificial love. [And] if it’s an artificial love, then there really isn’t anything true... I’m sure it would be programmed to (show that it likes you), you know, the computer inside of it telling it to show artificial love, but it doesn’t love you.” When we ask Orelia if she thinks she could love it, this seems to be a non-question for her, “they won’t love you back if you love them.” She explains that it would not be possible for her to love an AIBO because it can’t be cuddled, it is not soft and furry.” When we ask Orelia what AIBO would need for her to love it, she answers, “A brain and a heart.” Orelia feels that it is not worth investing in something that does not have the capacity to love back. She acknowledges that the artifacts are “cute” but feels that any emotional exchange would be a hoax.

In contrast, most of Orelia’s brother Jake’s questions about AIBO (“Will he get mad if you pick him up?”) ascribe agency and emotion to the robot. Orelia’s questions and comments remain concerned with how AIBO functions as a machine rather than its behavior as a pet, for example “It would just be mad at you because it’s programmed to know ‘if I don’t get the ball, I’ll be mad.’” In contrast to Jake, AIBO’s affective states do not seem genuine to Orelia. Also in contrast to Jake who frequently addressed AIBO directly, Orelia spoke to the researchers about AIBO, not to AIBO itself. Jake talks about AIBO as a pet; Orelia talks about AIBO as a machine. For Orelia:

[AIBO] is just following the color pink, which is another sign that if I had a green or orange ball, you know, he’s supposed to be following the pink, any ball. A puppy, a puppy would follow any color ball.

Researcher: What about if the dog was designed to follow any type of ball. To recognize any kind of ball and follow that. Would that make any difference to you?

Orelia: Well, not really because that’s the shape of the ball, the circular ball. But when I bounce a square ball or something...

Orelia finds that AIBO’s programmed attraction to a specific color and shape is just another sign that it lacks the intuition and biological and emotional heart of a real animal. She contrasts the genuine reciprocal emotional attachment she might have with a live dog, with interactions with AIBO. AIBO, she argues, is programmed to show emotions. Thus, its emotions are artificial and cannot be trusted. Further, Orelia explains:

I read a book called *The Wrinkle in Time*, where everyone was programmed by this thing called “It.” And all the people were completely on routine. They just did the same thing over and over. I think it’d be the same thing with the dog. The dog wouldn’t be able to do anything else. You know, for the person, it would be exciting at first, to have a creature they could take care of, they could play with, but after a while it would become routine. The animal needs to be doing that. And a dog, it would actually feel sorry for you. It would have sympathy, but AIBO it’s artificial.

Orelia’s attitude is consistent with her behavior with AIBO. She spends most of her interview and play session bouncing AIBO’s ball (for herself) and speaks to the researchers instead of offering the ball to AIBO. For Orelia, only living beings have real thoughts and emotions: “With a real dog if you become great friends with it, it really loves you, you know, it truly... It has a brain, and you know somewhere in the dog’s brain, it loves you, and this one [AIBO], it’s just somewhere on a computer disk... If a real dog dies, you know, they have memories, a real dog would have memories of times, and stuff that you did with him or her, but this one doesn’t have a brain, so it can’t.”

Orelia took AIBO home for a week. Her view off it as “programmed” and “unnatural” was unchanging. Perhaps her insistence on the importance of “heart” was related to her mother’s apparent coldness toward her. Her mother did not touch her, speak directly to her, or make eye contact with her. It is also possible that Orelia felt that she needed to provide the “correct” answers to the researchers and prove that in contrast to her brother, she knew the “real” state of affairs, and was not taken in by the artifacts’ emotional states.

Melanie/Imaginative-Maternal Approach

In the imaginative-maternal approach, relational artifacts are treated as sentient and in need of nurturance. In general, this approach includes animating the relational artifacts and the construction of scenarios that enable a child to develop his or her ideal relationship with them. This approach often

includes an emotional attachment to the artifacts and the minimization of the artifacts' mechanical nature.

Melanie, 10, is a soft-spoken, intelligent, creative, and well-mannered little girl. She seems confident and generally outgoing. Both of Melanie's parents have intense professional lives and Melanie is largely taken care of by nannies and baby-sitters. She says that she misses most spending time with her father. Melanie communicated sadness about her father's availability. Her father seems to be her point of reference, she mentions him throughout her interviews and play sessions. Melanie has a younger brother, Arthur, 4, and a little cousin Sophie who she tells us she loves very much. She also cares a great deal about her two family pets, a dog and cat. Melanie wants to be a veterinarian when she grows up.

Melanie stands out during our research visit with her class when we ask if anyone thought that AIBO might "know" that it was at the school. Melanie responds that AIBO probably does not know that he was at her particular school because he probably does not know it, but he almost certainly does know that he is outside of MIT and visiting another school. From the moment she sees AIBO animated, Melanie describes it as having a consciousness and feelings. When we ask Melanie if she thinks AIBO can die, she offers the following thoughtful response: "Hum, if his batteries run out, maybe. I think it's electric? So, if it falls and breaks then it would die, but if people could repair it, then I'm not really sure. It depends on if it falls and like totally shatters I don't think they could fix it, then it would die, but if it falls and one of its ear falls off, they would probably fix that, so in some cases it could die." Death of AIBO becomes a reality if it cannot be fixed, it is not a question of being a biological organism. Similarly, when we ask Melanie if she thinks that My Real Baby has feelings, she answers confidently that the doll does have feeling and that "it's got similar to human feelings, because she can really tell the differences between things, and she's happy a lot. She gets happy, and she gets sad, and mad, and excited. I think right now she's excited and happy at the same time."

While the other third-grade classmates treat the doll like an object, poking at the doll's eyes, roughly pinching her skin to test the rubber-ness, jabbing their fingers in the doll's mouth, Melanie comes over to rescue one of the dolls. She takes it in her arms and proceeds to play with the doll as if it were a baby, holding it close, whispering to it, caressing its face. Melanie's nurturing approach continues and develops throughout her participation in the study taking AIBO and the doll home. Throughout the play and interview sessions, Melanie again anthropomorphizes both the robot doll and dog. She talks consistently about their thoughts, desires, and intentions. She believes that they can see and recognize both her and her pets. Melanie has AIBO sleep next to her in her room, on a silk pillow near her bed.

Melanie's imaginative/maternal approach is highlighted during a particular incident when AIBO malfunctions. Her interaction with the relational artifact during this moment reveals an intense fantasy experience where rather than acknowledging that AIBO is broken, Melanie associates AIBO's actions to her own dog's behavior. AIBO begins making a loud mechanical wheezing sound, its walking becomes increasingly wobbly, and collapses several times in front of us until it finally breaks down completely. Melanie, watching this unfold says:

Melanie: Oh, that's what my dog does when he wants attention...I think it might be sleeping. Or just stretching in a different way than a normal dog would. AIBO? I think he's trying to be a little playful, or...who knows? I wonder what that sound means?

Researcher: What do you think it might mean?

Melanie: Either something's wrong because the light is flashing, or just, it's going to sleep. (long pause) There we go. (Laughs nervously as AIBO is trying to walk again). Cute little feet...Sort of what Nelly (Melanie's puppy) does. Ooh it's following the ball! Or at least trying to. (AIBO collapses) Aww, man! How playful. AIBO! (taking it in her arms) He knows that I'm holding it.

Researcher: How does it make you feel, when AIBO kind of falls down like that?

Melanie: Well, it makes me sort of think that it's sort of tired, and wants to rest. I don't know if it's still awake because the light's flashing again. I want to see if it's awake.

She gently picks up the limp AIBO and holds it close, petting it softly. The reality of AIBO having a technical problem is not a desired element in Melanie's story. Melanie tells us that when she brought this malfunctioning AIBO home, she and her friend treated it like a sick animal that needed to be rescued and gave it "veterinary care." Here she describes that she believed AIBO was ill, rather than broken:

Melanie: My friend seemed to think that it was playing dead, but I doubted it.

Researcher: What do you think was going on?

Melanie: I think it was a virus. Maybe the flu.

Researcher: Did you think that AIBO was sick?

Melanie: Yeah. Poor AIBO.

Researcher: How did that make you feel?

Melanie: I felt sad for it. It was a good AIBO.

Similarly, Melanie's interaction with My Real Baby involves relating to it as alive and as a being in need of her nurturing. She tries to make the doll burp several times after feeding it, saying that she knows this is what babies need to do. Melanie holds the doll increasingly close to her body and with ever more gentleness as time goes on. She believes that the doll is getting to know her better the more time they spend together.

Researcher: Do you think the doll is different now then when you first started playing with it?

Melanie: Yeah. I think we really got to know each other a lot better. Our relationship, it grows bigger. Maybe when I first started playing with her she didn't really know me so she wasn't making as much of these noises, but now that she's played with me a lot more she really knows me and is a lot more outgoing. Same with AIBO.

Researcher: How do you think the doll feels when you go to school?

Melanie: Maybe it feels sort of sad because it would have no one to play with, and maybe it would play with my other animals.

Researcher: How could you tell?

Melanie: I think when it starts to breathe a little bit harder.

It is clear at several different times that Melanie sees her role, and the role of those who interact with the doll, as one naturally of a parent. Melanie also says that when we brought the dolls to her school "they were probably confused about who their mommies and daddies were because they were being handled by so many different people." When we ask her about the doll she is about to take home, Melanie says, "I think that if I'm the first one to interact with her then maybe if she goes home with another person (another participant) she'll cry a lot, she knows how to cry, because she doesn't know, doesn't think that this person is its Mama." Melanie's first comment when bringing the doll back is that she now knows that she is not ready to be a mother. She explains that the doll is very "demanding," but is a good training tool for women who wanted to have children. She called the doll Sophie because it reminds her of her three-year old cousin; Melanie further explains, "Sophie. Like my cousin... I named her that because she was sort of demanding and said most of the things that Sophie does." Melanie spoke to the researchers about the resemblance between the doll and her cousin during each of her interactions with the doll.

Melanie plays with other toys and plain dolls at home; she explains that with those objects, she feels as though she is pretending. Melanie tells us that it is a different experience

with My Real Baby, that it feels much more like she really is a mother:

Researcher: Do you feel like you're pretending with My Real Baby?

Melanie: No.

Researcher: What does it feel like?

Melanie: Like I'm her real mom. I bet if I really tried, she could learn another word. Maybe Da-da. Hopefully if I said it a lot, she would pick up. It's sort of like a real baby, where you wouldn't want to set a bad example.

Melanie also says that she genuinely believes the doll when it expresses love to her, comparing the doll's realistic expression to her little brother:

Researcher: What do you think when it says it loves you.

Melanie: I think that she really does.

Researcher: How does that make you feel?

Melanie: I feel really good when it says that. Her expressions change. Sort of like Arthur.

Melanie shares how she enjoys pretending that My Real Baby is alive and "grows up" to be a four-year old (incidentally Arthur, her brother's age). Melanie also tells the researchers how she pretended with her friend that the first AIBO was a sick puppy they rescued from a shelter and pretended that she lived in a condo where she was taking care of her baby (My Real Baby.) The scenarios are pretend, but Melanie's attachment is sincere.

Throughout the interviews it is evident that Melanie has a very emotionally involved relationship with the relational artifacts. She thinks that they make good companions for her and that they would also be enjoyed by older people in nursing homes who would be reminded of being parents when taking care of the doll. Melanie frequently mentions that the doll and AIBO love her and make her "incredibly happy." She expresses great sadness when returning the toys. Before leaving, she opens the box where AIBO and the doll are and gives an emotional good bye to the toys. She hugs each one separately, tells them that she will miss them very much but that she knows we will take good care of them. She is concerned that the toys will forget her, especially if they spent a lot of time with other families.

In her first interview, Melanie explains how much she likes to take care of animals and people, such as by babysitting or tending to her pets. She repeatedly draws attention to feeling needed and feeling that she successfully nurtures others. Melanie says that her pets prefer her over other

family members and that she does a better job taking care of children than other children her age, in particular, that she has much practice holding babies because of her cousin Sophie and is therefore more capable. Melanie's relationship with AIBO and My Real Baby, in this context, seems to be an extension of a much deeper relational style. It is possible that Melanie's need to prove her ability to give love and nurture as well as her need to emphasize that she is indeed loved by children, pets, and the relational artifacts is related to her feeling that her parents, and her father in particular, are not providing her all the attention that she desires.

Jimmy/A life-situating approach

Most of the children and seniors who anthropomorphized relational artifacts also used them to speak about larger perceptions, relationships, and concerns. A life-situating approach accomplishes this in a dramatic way. For example, when individuals are unable to speak about something as difficult or traumatizing as a serious illness or death, they may be able speak about these issues through the relational artifact. The individual may be able to use the object both to express what he or she feels and begin to work through difficult issues.

Jimmy, 7, is just completing first grade. Jimmy is small and delicate for his age. He is thin and pale and sometimes loses the energy to talk during our sessions with him. Jimmy has a congenital condition that requires frequent medical attention. He spends much time in hospitals and his daily activities are often interrupted. His mother, a lawyer, asked to have her sons participate in the study. She gives the impression that she is putting in much effort to be strong for her son during his illness. She wants him to laugh and to enjoy life. Jimmy's favorite computer game is Roller Coaster Tycoon. Rather than playing to create the wildest roller coasters possible, as other children play the game, Jimmy plays in a way that maximizes maintenance and staffing so that the game gives him awards for the safest park. According to his mother, this concern about safety is typical of Jimmy, who also second-guesses her driving for safety. Jimmy's favorite toys are beanie babies. He says that he loves his dog Sam and enjoys having him watch television with him when he is sick. Sam one of his closest companions. Jimmy and his older brother Tristan, 12, seem very excited to participate in the study and to play with the toys.

Like many of the other children, Jimmy anthropomorphized the relational artifacts with which he interacted. But beyond this, Jimmy used the artifacts to work through fears and apprehensions about his situation, about his health.

For the most part, Jimmy grants AIBO and My Real Baby the status of objects with consciousness and feelings. Jimmy's anthropomorphization of AIBO is apparent when he rationalizes that AIBO slamming into the red siding is

actually AIBO scratching at a door, wanting to get in. Jimmy believes that AIBO wants to get to the other side of the door, that "he" wants to go inside. AIBO continues to repeatedly bang its head on the red edge of the closed door. Jimmy comments, "It thinks it's probably doing that because it wants to go through the door... Because he hasn't been in there yet." Jimmy describes how AIBO might miss him when he went to school and would want to jump in the car with him, like his dog does. In contrast, he does not believe that his Beanie Babies, the bean-bag animal toys, have feelings or miss him when he is at school; Jimmy only seems to attribute life-like qualities to animated toys. Jimmy tells us that other relational artifacts, like Furbies "really do" learn and are the same "kind of alive" as AIBO.

Jimmy find very few differences between AIBO and his dog Sam. Jimmy also speaks of AIBO as "the dog." He describes AIBO looking like a dog, its paws looking almost exactly the same and "the tail looks like a dog wagging its tail in very slow motion." Jimmy describes many similarities between his dog and AIBO—both have similar kinds of feelings and would both be equally scared of each other. Over the course of the sessions, Jimmy regularly attributes motivation and consciousness to AIBO, for example that AIBO's lights represent "his emotions" and that "When he's mad, when they're red. [and when they are green] He's happy." For Jimmy, even through he "knows" AIBO is a robot, AIBO's emotional capacity is very similar to his dog Sam, believes that AIBO has the same kind of feelings as Sam, but that Sam is a happier dog than AIBO.

Researcher: Do you think he's happy like Sam's happy?

Jimmy: Um, Sam's more, usually more happy than he [AIBO] is most of the time.

Researcher: Why do you think that is?

Jimmy: Because Sam doesn't get mad every two seconds.

Researcher: Do you think AIBO gets really mad?

Jimmy: Mmm, sometimes.

Jimmy says that AIBO can learn tricks and could be taught just like Sam but that with AIBO you would have to teach it a little differently. At the same time as Jimmy anthropomorphizes AIBO, he tells us that he knows AIBO was not born and that it "probably came from a store [and before that] probably a robot company where they build robots." Jimmy attributes genuine feelings to AIBO and says that AIBO can recognize and love him; this does not depend on imagining AIBO as alive in the same way that an animal or a person is alive.

Throughout his sessions, Jimmy compares his dog to what AIBO can do, but ultimately seems to think of AIBO as a super robot dog. Jimmy seems to only observe his dog's

limitations compared to AIBO; he says that AIBO is probably as smart as Sam and “at least he isn’t scared as my dog.” When we ask Jimmy if there are things that his dog can do that AIBO can’t do, Jimmy answers that “there are some things that Sam can’t do and AIBO can. Sam can’t fetch a ball. AIBO can. And Sam definitely can’t kick a ball.” At several other occasions during the session, in response to AIBO doing a certain trick and Jimmy would comment, “my dog couldn’t do that!” AIBO in many ways is the “better” dog. AIBO is perhaps one fifth of Sam, but AIBO is immortal, invincible. AIBO cannot get sick or die. AIBO represents everything Jimmy wants to be.

Jimmy forms such a strong bond with AIBO that he tells us that he would probably miss AIBO as much as Sam if either of them died. As we talk about the possibility of AIBO dying, Jimmy explains that he sees AIBO as being capable of dying, and is concerned about protecting it.

Researcher: Do you think that AIBO could die?

Jimmy: Hmm, if he ran out of power yeah. If you turn him off he dies, well, he falls asleep or something... He’ll probably be in my room most of the time. And I’m probably going to keep him downstairs so he doesn’t fall down the stairs. Because he probably, in a sense he would die if he fell down the stairs. Because he could break. And. Well, he could break and he also could...probably or if he broke he’d probably he’d die like.

Researcher: How would you feel about that?

Jimmy: Sad.

Researcher: Would it make you feel as upset as if something happened to Sam?

Jimmy: Yeah. Probably.

Jimmy’s general concern for safety and healthiness is evoked by AIBO and expressed by Jimmy wanting to safeguard, and later also test, AIBO’s strength and aliveness. Jimmy can feel as attached to a non-biologically alive entity as to his dog. Jimmy “knows” that AIBO does not have a real brain and a heart, but sees AIBO as an mechanical kind of alive, where it can function as if it had a heart and a brain:

Researcher: Is AIBO alive?

Jimmy: In a way, yeah...he can move around. And he moves around a lot. And he’s also got feelings. He shows, he’s got three eyes on him, mad, happy, and sad. And well, that’s how he’s alive.

Researcher: How is AIBO different from Sam, or, other things that are alive?

Jimmy: Well, he’s alive like, and he’s not uh...well, he’s got wires in him? And that’s different from us because...well we don’t have wires in us. He has one main piece of wire in him, we have a heart. So that’s one of the ways he’s alive.

Researcher: Does AIBO have a heart?

Jimmy: Well, yeah. This wire thing in here is probably like a heart for him.

Researcher: What do our hearts do?

Jimmy: Well, they pump blood into parts of our body. Just like this thing that’s, this is probably a battery case or something, but this thing in there, it makes his whole body work basically.

Perceiving AIBO as alive may be a way for Jimmy to look towards something that acts alive and can resist death. His own anxieties can be relieved through playing with something that is a symbol of the ambiguous boundary between alive and not alive, between the animate and inanimate, the alive and not alive. If AIBO can be alive through wires and a battery then this leaves hope that people can be “recharged” and “rewired” as well. For Jimmy, robots offer a new category for understanding life and death, no blood is needed to have emotions and a mind, a battery and wires give life.

Jimmy seems to see other relational artifacts in the same way. He attributes much emotion to the doll that he describes as a toddler and tells us that Furby is alive in the same ways that a Furby is alive; they can see, they can learn, but they are only different from humans because they are made with wires. Jimmy indicated that his other toys like the Beanie Babies, probably did not have feelings and were less alive than AIBO or Furby.

One of Jimmy’s principal activities with AIBO at home was to have it be attacked by the Bio Bugs [note: Bio Bugs, made by Hasbro/Wowwee, are robotic toy creatures that walk and fight each other as they develop through several stages, gaining in “survival skills” and aggression.] These were the only other toys he had interact with AIBO. Jimmy describes the fighting scenes vividly and with much excitement. Although this could be simply a young boy’s enthusiasm over a duel, Jimmy’s case seems different. He seems very much adverse to any type of fighting or aggression, he fears any risk of harm. I think that Jimmy’s Bio Bugs attacks on AIBO are about much more than enjoying a fight, it is about the survival of AIBO, the relational artifact that embodies Jimmy’s hope for a life-form that defies death, and as an extension of his self. The “bugs” are the perfect embodiment of a virus, like one of the several that Jimmy has to fight off. It is a “step-up” perhaps from the imaginative games he engages in with the Beanie Babies, which he feeds pretend food. Also suggesting that

Jimmy interacts with AIBO as an extension of his self is that as much as Jimmy appreciates the independence of AIBO, he also says that he wants to be able to control it more. He wants to be able to make it chase the Bug, for example. We didn't ask how he thinks AIBO would feel about being controlled, or to what extent he feels himself controlled; it is possible that wanting to control AIBO is an extension of wanting to control his own body and health.

Jimmy seems concerned that his brother, Tristan, barely played with AIBO during the time they took it home. Jimmy brings this up to us with a shaky voice, he explains that his brother didn't play with AIBO because "he didn't want to get addicted to him so he would be sad when we had to give him back," but emphasizes that he did not share the same fear. He made the most of his time with AIBO. It is likely that Jimmy interprets his brother's lack of connection to AIBO as Tristan not wanting to connect more with him because of a fear that Jimmy might die. Jimmy and Tristan do not seem to be very close, possibly in part due to their age difference and their very different personalities. Jimmy's comment seems to echo his concern with his own, and others' mortality, a fear that that his brother or others might not invest much in him because of his illness. Jimmy seems to attribute Tristan's reluctance to bond with AIBO to a fear of getting too attached to something that was only passing in his life.

Jimmy says that he thought AIBO would miss him when he went to school, after taking AIBO home, he says that AIBO probably missed him on the second day, but not on the first because AIBO was charging. When asked what the difference was between AIBO charging and AIBO not charging, Jimmy explains "Well, when he's charging that means, well he's kind of sleepy when he's charging but when he's awake he remembers things more. And probably he remembered my hand because I kept on poking in front of his face so he can see it. And he's probably looking for me." Jimmy felt that AIBO missed him and felt attached to him, later echoed when Jimmy speaks of AIBO missing him after returned to us. Jimmy says that he will miss AIBO "a little bit" but that it is AIBO that will probably miss him.

Researcher: Do you think that you'll miss AIBO?

Jimmy: A little bit. He'll probably miss me.

Discussion

One goal of this work is to help designers and consumers keep human purposes in mind as they design and deploy technology and then choose how to make it part of daily life. Authenticity in relationships is a human purpose. So, from that point of view, the fact that our parents, grandparents, and our children might say "I love you" to a robot, who will say "I love you" in return, does not feel completely comfortable and raises questions about what

kind of authenticity we require of our technology. Do we want robots saying things that they could not possibly "mean?" What are the emotions that we think are most appropriate, most developmentally healthy for our children to have with relational technologies. Robots might, by giving timely reminders to take medication or call a nurse, show a kind of caretaking that is appropriate to what they are, but it's not quite as simple as that. Elders come to love the robots that care for them, and it may be too frustrating if the robot does not say the words "I love you" back to the older person, just as we can already see that it is extremely frustrating if the robot is not programmed to say the elderly person's name. These are the kinds of things we need to investigate, with the goal of having the robots serve our human purposes.

I juxtapose the cases of children with the cases of seniors because the issues they raise very similar issues. The degree of attachment to even very simple relational artifacts is great. In studies with relational artifacts with more complex capabilities such as Kismet and Cog (Turkle et al, 2004) the desire to have the robots say one's name, respond to love with love were even more intense.

The case studies presented here begin to sketch out a new realm for object relations psychology that has major implications for the development of character, communication, and our sense of being human. The design of relational artifacts is a large, indeed awesome task. One of the most awesome things about it is that it will cause us, as people, to ask ourselves what it means to be in relationships, since some of our significant relationships will now be with machines,

In sum, here we have seen the observation of robots and people serve as scaffolding for conversations about larger issues: philosophical, psychological, and social. These issues are important for roboticists for two main reasons. First, ethnographic work with even simple robots illustrate how cybercompanions opens up conversations about what is essential about aliveness, about what is special about being a person, about the roles of thought and feeling, affect and cognition in defining human uniqueness. Second, there are significant individual differences among the users of robotic technology, differences that have to do with personality and cognitive style. As robots move into the therapeutic domain, such individual differences will become increasingly relevant to the field of "clinical robotics."

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